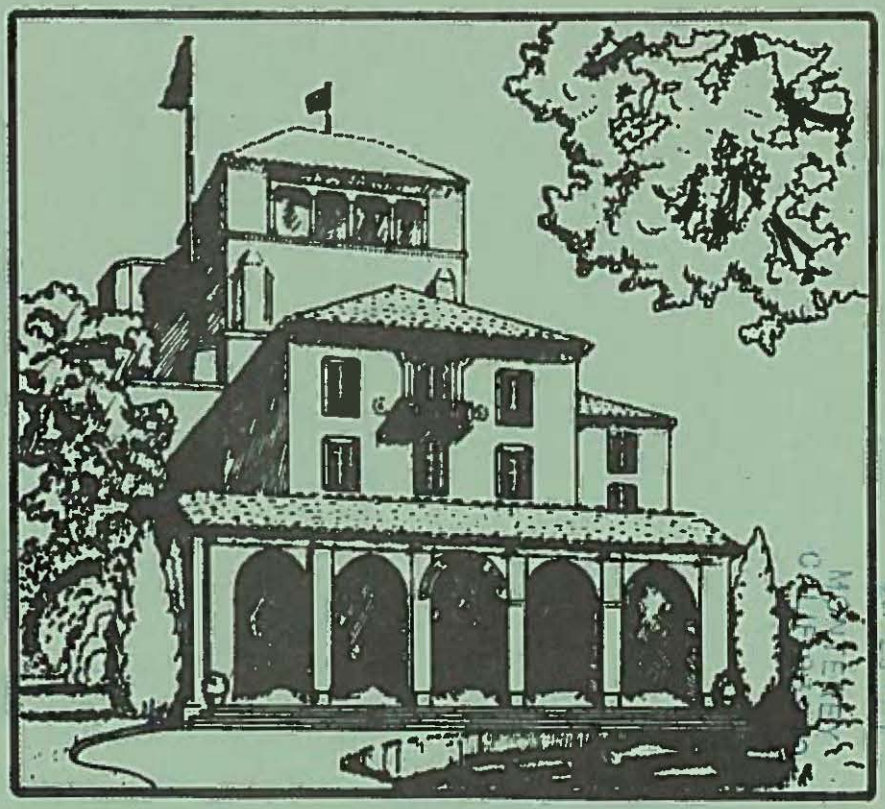
1971-09-20

Naval Postgraduate School Faculty Bulletin, 1971-09-20



Naval Postgraduate School

FACULTY BULLETIN

ISSUE NO. 14-71 20 September 1971

FACULTY PROFESSIONAL ACTIVITIES

Assistant Professor Richard H. Franke, Department of Mathematics, has been chosen for inclusion in the 1971 Edition of Outstanding Young Men of America in recognition of his professional and community leadership. Professor Franke is the author of several professional articles and is a reviewer for Mathematical Reviews, among his other accomplishments.

Congratulations to Professor R. E. Gaskell, Chairman, Department of Mathematics, upon his election as Vice Chairman, Mathematics Division, American Society for Engineering Education.

At the Navy Mathematics Workshop in Numerical Analysis, sponsored by ONR at Annapolis, Maryland, 9-13 Aug 1971, Professor Frank D. Faulkner, Department of Mathematics, chaired one of the sessions and presented a paper entitled "Bounds on the error in solving control problems and related differential games by Newton's method." Assistant Professor David A. Ault, Department of Mathematics, also presented a paper entitled "Approximation from convex cones in Hilbert space." Assistant Professor Richard H. Franke, Department of Mathematics, presented a talk entitled "Constructing Cubatures from Bivariate Orthogonal Polynomials." The meeting was attended by 70 mathematicians from universities and laboratories throughout the United States and England.

Assistant Professor Noel E. J. Boston, Department of Oceanography, and Assistant Professor Kenneth L. Davidson, Department of Meteorology, presented papers at the XV General Assembly of the International Union of Geodesy and Geophysics, Moscow, USSR. These papers were two of the nine selected by the U. S. Screening Committee of the American Geophysical Union for the Symposium on Air-Sea Interaction, August 6-9. Professor Boston was in attendance at the Symposium to present his paper "An Investigation of High Wave Number Temperature and Velocity Spectra in Air." Professor Davidson's research on "The Influence of Water Waves on the Adjacent Air Flow" was presented by a co-author, Professor Donald J. Portman, University of Michigan.

Professor Boston visited, prior to attending the IUGG Symposium, the National Institute of Oceanography, Wormley, England, and on the return trip the Meteorology Laboratory, Danish Atomic Energy Commission, Riso, Denmark. Professor Boston also conferred with Professor Glenn Jung, Department of Oceanography, who is presently on sabbatical at the Institute of Physical Oceanography, University of Copenhagen.

Boston, N. E. J.

An Investigation of High Wave Number Temperature and Velocity Spectra in Air

Abstract: Turbulent temperature and velocity fluctuations in air were measured at a height of 4 meters over a tidal mud flat. Particular attention was focused on the high wave

number, small scale region of the spectra of these fluctuations were made with a constant temperature hot wire anemometer; the hot wire consisted of a platinum wire 5 μm in diameter and approximately 1 mm in length. Temperature fluctuations were measured with a platinum resistance thermometer which consisted of a platinum wire 0.25 μm in diameter and about 0.30 mm in length.

The velocity spectra results agree well with the classical results of Grant, Stewart and Moilliet (1962) and Pond, Stewart and Burling (1963). In addition, they extend the velocity spectrum in air to slightly higher wave numbers. The one-dimensional Kolmogorov constant K' estimated from these data was 0.50.

The temperature spectra clearly show the shape of the one-dimensional temperature spectrum in air beyond the -5/3 region. These spectra show that in air there is no -1 region and that temperature and velocity spectra are very similar. The value of the scalar constant K'_θ, which appears in the scalar -5/3 law, computed from these data was 0.81. Direct measurement was made of all parameters that enter into the calculation of it.

Davidson, Kenneth L. and Portman, Donald J.

The Influence of Water Waves on the Adjacent Air Flow

Abstract: Measurements of wind component and temperature fluctuations from 2 to 8 meters above waves in Lake Michigan and in the Atlantic Ocean have been analyzed in terms of similarity theory. Both energy of the fluctuations and spectral distributions show that turbulent air flow over waves is significantly influenced by the waves.

Initial results indicate that the dimensionless root mean square measures of the fluctuations (σ_u/u^*, σ_v/u^*, σ_w/u^*) are in general agreement with the findings of Kitaygorodskii and of Volkov with respect to their dependence on dimensionless height (z/L) and dimensionless phase speed (C/u^*) of the waves that correspond to the wave spectra maxima.

At the frequencies of the wave spectra maxima it is found that (1) spectra of the velocity components generally have energy concentrations, (2) cospectra that represent vertical fluxes of horizontal momentum have significant extrema, and (3) on several occasions downward flux was enhanced at an upper level at the same time that it was decreased at a lower level.

Associate Professor K. T. Marshall, Department of Operations Research and Administrative Sciences, has been appointed to the editorial board of the Journal on Applied Mathematics, one of the Journals of the Society of Industrial and Applied Mathematics. Professor Marshall's activities will include the processing and refereeing of manuscripts submitted for publication in the areas of congestion theory, applied stochastic processes, and stochastic networks. He is currently involved in similar functions as an associate editor of Operations Research, the Journal of the Operations Research Society of America.

Professor M. B. Kline, Department of Operations Research and Administrative Sciences, has been appointed Chairman of the Logistics Education Committee of the San Francisco Bay Area Chapter of the Society of Logistics Engineers. He will present a talk , "When does integrated logistics support fit into current DoD System Acquisition Policy?" at the Chapter Meeting on October 4, 1971.

Professor T. Sarpkaya, Department of Mechanical Engineering, has upon invitation presented three talks at Institut fur Stromungslehre and Stromungsmaschinen of the University of Karlsruhe (West Germany). The talks were titled:

1. Stromung einer viscoelastischen Flussigkeit zweiter Ordnung in Staupunktsnahe. (Stagnation Point Flow of a Second-Order Viscoelastic Fluid).

2. Experimentelle und theoretische Untersuchungen der Stromung auf der Saugseite eines schlanken Deltaflugels. (Theoretical and Experimental Investigation of the flow on the suction side of slender Delta wings).

3. Ubertragung von Signalen in Fluidiksystemen. (Signal Transfer in Fluidic Systems).

FACULTY PUBLICATIONS

Cooper, T. E.

Mathematical prediction of cryogenic lesion. Chapter 5 of Cryogenics in surgery, by H. Von Leden and W. G. Cahan. Medical Examination Pub. Co., Flushing, N.Y. 1971.

Abstract: The book covers all areas of cryogenic surgery relating to clinical practice and animal research including the instrumentation, mechanical and mathematical aspects. Chapter 5 presents analytical techniques whereby the volume of destroyed tissue around cryosurgical probes of various sizes and geometries can be predicted.

Comstock, Craig

Steepest Descent and the merging of several waves. Bulletin of Polytechnical Institute of Iasi, Vol. XVI, No. 3-4, 1970, 11. 117-126.

Abstract: The question of how to obtain an analytic description of the merging of several waves is studied. It is assumed that the wave structure is given as a complex integral (say a Fourier integral) and an asymptotic approximation is desired. Motivated by the work of Ursell we study the asymptotic properties of integrals of the form $\int \exp ip(t)\,dt$ where p(t) is a polynomial in t. Explicit asymptotic formulas are obtained for the two types of polynomials
$p(t)=zt+t^{n+1}/n+1$ and
$p(t)=a_1 t+a_2 t^2+\ldots+a_{n-1}t^{n-1}+t^{n+1}/(n+1)$.

Franke, R. H.

Review of "Characterization of best spline approximations with free knots" by D. C. Handscomb in Approximation Theory (Proc. Symposium, Lancaster, 1969), pp. 63-70, Academic Press, 1970. Review #735, Mathematical Reviews, Vol. 42, July, 1971, pg 133.

FACULTY NEWS NOTE

Professor Warren C. Thompson, Department of Oceanography, has been licensed as a Registered Geologist in the State of California under a newly legislated act establishing a State Board of Registration for Geologists. The purpose of the act is to contribute 'to the safety, health and property of the people of California and to the promotion of the public welfare" in the "previously unregulated professional field" of geology.

FACULTY PROFESSIONAL ACTIVITY

Provost Milton U. Clauser attended the second meeting of the Space Systems Advisory Committee, Space Program Advisory Council, NASA, at the Manned Spacecraft Center, Houston, Texas, on 13 September 1971. He was appointed a member of this Committee on September 3, 1971.

RESEARCH AWARDS

The following is a list of sponsored research funds received by the Naval Postgraduate School during the period 1 August through 31 August 1971 (FY 1972). The projects indicated by asterisks are continuations of existing programs.

Source	Amount	Title	Principal Investigator
Naval Ship Systems Command Washington, D. C.	$ 8,500	Elastic Machine Design Applied to Cam and Valve Dynamics	Asst Prof R. C. Winfrey Mechanical Engineering
Naval Weapons Center China Lake, Calif.	49,792	Magnetic and Electric Single-particle Susceptibility	Assoc Prof W. M. Tolles Material Science and Chemistry
Air Force Office of Scientific Research Arlington, Virginia	2,833	Symposium on Instrumentation for Air-breathing Propulsion	Prof A. E. Fuhs Aeronautics
Natnl. Aero & Space Admin. Ames Research Center Moffett Field, Calif.	26,600	*Unsteady Boundary Layer	Assoc Prof J. A. Miller Aeronautics
Naval Ship Systems Command Washington, D. C.	20,000	Study of Forward Sound Scatter	Prof H. Medwin Physics
Air Force Propulsion Lab. Wright-Patterson AFB Ohio	2,833	Symposium on Instrumentation for Air-breathing Propulsion	Prof A. E. Fuhs Aeronautics
Naval Air Systems Command Washington, D. C.	$ 8,000	*Unsteady Transonic and Supersonic Cascade Flows	Assoc Prof M. F. Platzer Aeronautics
Director of Laboratory Programs Washington, D. C.	18,000	Examine Potential Solutions for Shipboard Pollution Problems in Harbors and Along Continental Shelf	Assoc Prof C. F. Rowell Material Science and Chemistry
Naval Ordnance Systems Command Washington, D. C.	20,000	*A Study of Burning Rate Mechanisms and Acceleration Sensitivity of Solid Propellants	Asst. Prof D. W. Netzer Aeronautics

Naval Weather Research Facility Hillcrest Heights, Md.	4,087	*Weather Satellite Input to FNWC's Numerical Analysis and Prediction	Prof R. J. Renard Meteorology
Office of Naval Research Arlington, Virginia	106,900	Oceanographic and Acoustic Experiments Near the Sea Surface, Top and Bottom	Prof D. F. Leipper Asst Profs N. E. Boston E. B. Thornton R. S. Andrews Oceanography Profs O. B. Wilson, Jr. and H. Medwin Physics
Naval Air Systems Command Washington, D. C.	6,500	Naval Air Systems Command Experience Tour	Assoc Prof R. E. Ball Aeronautics
Natnl. Aero & Space Admin. Lewis Research Center Cleveland, Ohio	2,833	Symposium on Instrumentation for Air-breathing Propulsion	Prof A. E. Fuhs Aeronautics
Chief of Naval Research Arlington, Virginia	25,000	*Optimization Studies	Profs J. R. Borsting and D. P. Gaver, Assoc Prof K. T. Marshall, Asst Prof J. K. Hartman Operations Research and Administrative Science

TRAVEL ORDERS WRITTEN
19 AUG - 14 SEP

pported by BuPers Funds:

ısgrave, G. L. .rrick, P. M.	8/29-9/1 " "	Vancouver, B. C.	Att. Western Economics Assn Conf
.lliams, D. G.	8/26-8/26	Mtn View, Ca	Discussions at NASA Ames Research Center on description and status of ILLIAC IV Project activities.
nes, C. R.	8/29-9/1	Vancouver, B. C.	Attend Western Economics Assn & Western Finance Assn. Conferences; recruit new faculty.
ster, R. S.	8/31-9/2	Wash, D. C.	Liaison with sponsor.
nner, W. W.	9/7-9/17	Barrow, Alaska	Teach course at Naval Arctic Researc Laboratory.
oper, A. W.	9/12-9/19	Oxford, England	Present paper at Xth Intn'l Conference on Phenomena in ionized gases.
ll, R. W.	9/15-9/19	San Fran., Ca.	Att. XV Symposium, Society for Exp. Test Pilots, and recruiting.
mstock, C.)ops, G. A.	8/30-9/4 " "	State Col., Penna.	Present paper at annual summer mtg of American Math Society.
mstock, C.	8/20-8/22 8/25-8/27	Berkeley, Ca	Att. sessions at AMS Summer Res. Ins on Partial Differential Equations.
ckett, G. R.	10/3-10/9	San Antonio	Att. Mil Librarians Workshop.
wton, R. E.	9/7-9/12	Champaign, Ill.	Att. ONR/Symposium on Numerical & Computer Methods in Struct. Mech.
rsting, J. R.	8/29-9/2	Wash, DC. Boston&S. F.	Meet w/research sponsors, recruit new faculty.
ırks, H. B.	9/9-9/11	San Jose	Mtg of Soc for Gen'l Sys. Research.
ehler, W. F.	10/6-10/8	WashDC	Consult with Bureau of Naval Personne
lch, P. R.	9/9-9/11	SanJose	Participate in 2nd Ann Inst of System Education of Nat'l Task Force on Systems Education (West Div)of Societ for General Systems Research.

Supported by Research Funds:

Houlihan, T. M.	9/10-9/15	Wash D.C.	Present report at Ordnance Hydroballistics Adv Comm of the NavOrd Command 1971 Annual Meeting.
Schacher, G.E.	9/8-9/10	China Lake	Consultation
Tolles, W. M.	" "	" "	"
Leipper, D. F.	8/20-8/20	Oakland	Check on progress of ACANIA Convers
Titus, H. A.	8/26-8/29	Pt Mugu	Attend research briefings on ECM.
Tayachandran, T.	9/9-9/9	San	Discuss research
Wilde, C. O.	" "	Diego	
Dally, E. B.	9/7-9/7	Hunters Pt.	Pick up equipment for LINAC
Leipper, D. F.	9/8-9/8	Oakland	Observations of scientific equipment
Galt, J. A.	" "	"	on ACANIA on cruise.
Boston, N. E. J.	9/15-9/16	San	Inspect NEL tower.
Thornton, E.B.	" "	Diego	
Andrews, R. S.	9/20-9/24	San Diego	Att. IEEE Conf on Ocean Engineering; visit at Scripps Inst. of Oceanography.
Titus, H. A.	9/13-9/15	Palo Alto San Diego	Discuss research; present paper at Conf on Nonlinear Estimation Theory.
Collins, D. J.	10/20-10/22	Silver Spr. Md.	Att. and moderate a portion of the NOL Workshop on Flow Visualization.

No cost to the Government:

Knorr, J. B.	8/26-8/28	San	Att. Wescon Conference, att technical
Kirk, D. C.	8/24-8/24	Fran.	sessions on microwave solid state de-
Ward, J. R.	8/24-8/24	"	vices and microwave spectroscopy.
Clauser, M.U.	9/12-9/13	Houston	Comm Mtg at Manned Space Center.
Bjarnason, L. L.	9/22 - 1/1	Germany, Italy, France, Belgium, Luxemburg, Holland, Iceland and Scandinavia.	Research in Int'l Security Problems.
Codres, U.R.	9/19-9/24	Alameda	Familiar. cruise USS CORAL SEA.
Lindsay, G. F.	7/16-8/8	Dayton, Ohio	Work on research at Wright PattersonAF
Koehler, W. F.	9/13-10/5	Bergen, London Copenhagen, Amsterdam	Participate in U.S. Engineering Educators Goodwill People-to-People Program Delegation.
Ling, G.	9/10-9/20	Wash, D. C.	Comm on Govn Procurement, Cost& Pricing Study Group.